REMARKS:

Claims 1-12 and 15-19 are in the case and presented for consideration.

Independent Claims 1 and 12 have been amended to structurally distinguish over the prior art use of discrete gas passaged rather than the exclusive use of the porosity of the porous material to establish the gas flow for stating, e.g. in Claim 12:

> "a first electrode member consisting of a porous substrate through which all of a fuel gas or air passes, and having two pairs of opposite side surfaces and wherein all of the fuel gas or air can pass directly to the first electrode member without passage through any other gas flow path or passage in the porous substrate and wherein the porous substance is the only gas flow path in the first electrode member."

The same type of amendment was made in Claim 1.

This was done to make it clear that "in a porous substrate there is no passageway 13 disclosed in Poeppel Patent", and "the porous substrate itself is a gas passage" in the present invention. Support for this amendment is found in page 14, lines 2-3 [0038] and page 27, lines 1-5 [0062] of the specification.

1. The porous substrate has only minute holes arranged at random, and sufficiently for the needed gas flow property.

2. The gas can not flow in a straightforward way as it would in a flow passage owing to the random arrangement of minute holes of the porous substrates, but instead, flows in each of a multiplicity of vertical and horizontal directions as seen locally. The gas in the

porous substrates flows in one direction from the gas inflow opening to the gas outflow opening as a whole.

Terminal Disclaimer

A corrected Terminal Disclaimer is submitted with this amendment and has been signed by the undersigned who is an attorney of record, being registered under this firms Customer Number 21706. Although the fee was paid already, the Commissioner is hereby authorized to charge Deposit Account No. 14-1431 in the amount of $130.00 or for other fee required for recording the Terminal Disclaimer.

New References

Six Japanese prior art references have been listed in the attached Form PTO/SB/08a which is submitted with this amendment.

In the these references a single cell of a flat plate type solid oxide fuel cell utilizing a fuel electrode and air electrode which are formed by a porous substrate, is described.

It is described in the JP 6-223847A that the ceramic member 14 formed by the plurality of ceramic layers 14a-14i are sandwiched by the solid electrolyte plate 12. Furthermore, the relative porosity of these ceramic layers is 12 < 14a < 14b < 14c < 14d < 14e > 14f > 14g > 14h > 14i > 12, and the porosity of ceramic layer 14a and 14i is made to approximate the density of the solid electrolyte plate 12 at most, the ceramic layer 14e is made to pass a fuel gas or air as the highest porosity and the plurality of ceramic layers including ceramic layer 14e are made to pass a fuel gas or air, are described.

This is the same as a reference cited in International Search Report and has already

filed in an IDS of U.S. patent application 09/979,822 that is not U.S. Patent 6,740,442, the subject of the Terminal Disclaimer.

Since the remaining rejections are all based on obviousness rejections the following comments are being made of record.

Obviousness analysis in accordance with Graham v. John Deere approach

Graham v. John Deere, 383 U.S. 1, 148 U.S.P.Q. 459 (1966) outlined the approach that must be taken when determining whether an invention is obvious 35 U.S.C. §103(a).

In *Graham*, the Court stated that a patent may not be obtained if the subject matter would have been obvious at the time the invention was made to a person having ordinary skill in the art, and emphasized that non-obviousness must be determined in the light of inquiry, not quality (supra at page 467). In accordance with *Graham*, these inquiries must be made in determining whether an invention is obvious:

(1) The scope and content of the prior art are to be determined.

(2) The differences between the prior art and the claims at issue are to be ascertained.

(3) The level of ordinary skill in the pertinent art resolved.

(4) Objective evidence relevant to the issue of obviousness.

The Applicant will now set forth his analysis of obviousness in view of the requirements of *Graham v. John Deere* and the Office Action issued by the Examiner.

Scope and content of the prior art

The scope and content of the prior art is represented by the references cited by the Examiner which will all be discussed later in these remarks.

Person of ordinary skill in the art

Ascertaining the level of ordinary skill in the art at the time Applicant discovered his solid oxide fuel cell is impractical in an *ex parte* proceeding since neither the Examiner nor the Applicant have survey evidence related to the qualifications of the technical people working in this field, or the testimony of an expert witness familiar with the qualifications of the technical people working in this field. In view of this, Applicant submits that the only facts of record pertaining to the level of skill in the art are found within the prior art of record.

Applicant further submits, based upon its review of the prior art of record and the prior art in this field related to solid oxide fuel cells, the art is crowded and advancements in the art are incremental.

General Reasons Applicant's invention was not obvious to one of ordinary skill in the art at the time the invention was discovered

When considering whether Applicant's claimed invention is obvious, Applicant asks the Examiner to recognize the danger of employing "hindsight" in his/her analysis, particularly in a field where the art is crowded and improvements in the technology are incremental [if true to the art of the invention]. This danger is inherent in the examination process since the Examiner knows what the invention is when he/she determines whether Applicant's invention is obvious. On the other hand, the only information Applicant has at

the time of its discovery are the teachings of the prior art, so the inquiry related to obviousness must focus on the content of what the prior art teaches and suggests to the person of ordinary skill in the art at the time the invention was made. In this regard, Applicant hopes that the Examiner will keep in mind the following comments excepted from *In re Kotzab*, 55 U.S.P.Q. 2d 1313 (Fed. Cir. 2000) at page 1317:

> A critical step in analyzing the patentability of claims pursuant to section 103(a) is casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field. See *Dembiczak*, 175 F.3d at 999, 50 USPQ2d at 1617. Close adherence to this methodology is especially important in cases where the very ease with which the invention can be understood may prompt one "to fall victim to the insidious effect of a hindsight syndrome wherein that which only the invention taught is used against its teacher." *Id.* (quoting *W.L. Gore & Assocs., Inc., v Garlock, Inc.*, 721 F.2d 1540, 1553, 220 USPQ 303,313 (Fed. Cir. 1983).

Returning now to the Final Rejection.

First Rejection of Claims under 35 U.S.C. §103(a)

Claims 1-8, 11-12, 14, 17, 19 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,476,196 to Poeppel et al. ("Poeppel") in view of U.S. Patent 5,330,859 to McPheeters ("McPheeters").

The Applicant respectfully traverses this rejection.

Difficulty of combining Poeppel and McPheeters

Generally, electrodes (both air electrodes and fuel electrodes) used for fuel cells are required to have porosity. However, the porosity in this case is the porosity needed to change the fuel ans air molecules into a better condition for the electrochemical reaction (electrode reaction) which advances within these electrodes, and is different from porosity which enables gas to fully pass through the body and which is needed for the porous substrate formed of a electrode member constituting a single cell in this application and as claimed here.

In the Poeppel patent, the porosity is used to change the electrochemical reaction into a better condition which advances with the electrodes (see col. 8, lines 48-51 in Poeppel). Therefore, in Poeppel, it is necessary to secure a gas flow property by defined separated spaces such as passageways 13 and 14 because the gas flow property is not sufficient only with the porosity of the electrode member itself.

Here, McPheeters does not particularly disclose a meaning of the porosity in the electrode member, but a person ordinary skilled in the art would have understand this meaning in McPheeters. Namely, in McPheeters the fuel channel 24 and the air channel 28 are provided to flow the gas along a electrode surface and McPheeters discloses that the electrodes are made thin in order to provide a “short conduction path” and “low voltage loss” with materials of mediocre electrical conductivity (see col. 3, lines 18-21 in McPheeters).

Therefore, when a person skilled in the art compares a general meaning of the porosity in the electrode of a fuel cell and a meaning of the porosity in the electrode member of Poeppel, it is generally accepted, that the person skilled in the art understands that the passageway disclosed in Poeppel can not be provided in the electrode member

itself owing to the thin electrode so that the fuel channel 24 and the air channel 28 are provided to flow the gas along a electrode surface.

That is, also in McPheeters, the porosity is also ensured to change the electrochemical reaction into a better condition which advances with the electrodes like in the Poeppel patent. Therefore, also in the McPheeters patent, it is generally accepted that the gas flow property is not securable only with the porosity of the electrode member itself so that the fuel channel 24 and the air channel 28 are provided to flow the gas along a electrode surface.

The meaning of the porosity in the electrode member of McPheeters is much the same as that of Poeppel. Therefore, there is no reason to combine the electrode of the McPheeters patent with the electrode of the Poeppel patent and if there is no reason to make this combination it is not seen how the combination can reach the claimed invention in an obvious manner.

Second Rejection of Claims under 35 U.S.C. §103(a)

Claims 9, 15, 16, and 18 were rejected under 35 U.S.C. 103(a) as being unpatentable over Poeppel in view of McPheeters as applied to claim 5, and further in view of United States Patent 6,045,935 to Ketcham et al. ("Ketcham").

Applicant respectfully traverses the Office's rejections since these claims further distinguished the invention over the prior art and, while Ketcham may teach the air flow path and the fuel flow path are arranged parallel and the reactants flow in a co-current arrangement with respect to each other inside the perforated ceramic tube, Ketcham would not provide an further reason for combining Poeppel and McPheeters.

Third Rejection of Claims under 35 U.S.C. §103(a)

Claim 10 was rejected under 35 U.S.C. 103(a) as being unpatentable over Poeppel in view of Ketcham and McPheeters as applied to claim 9, and as evidenced by Morgan Advanced Ceramics Datasheet for Glass Ceramic.

Applicant respectfully traverses this rejection as well since Claim 10 further distinguished the invention over the combination and neither Ketcham nor Morgan provide the missing rational for combining Poeppel and McPheeters in the first place to render Claim 10 obvious.

Accordingly, the application and claims are believed to be in condition for allowance, and favorable action is respectfully requested.

No new matter has been added.

If any issues remain, the Examiner is respectfully invited to contact the undersigned at the number below, to advance the application to allowance.

Respectfully submitted,

/PETER C MICHALOS/
Peter C. Michalos
Reg. No. 28,643
Attorney for Applicant
(845) 359-7700

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NOTARO & MICHALOS P.C.
100 Dutch Hill Road, Suite 110
Orangeburg, New York 10962-2100

Customer No. 21706

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